

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

UPLAND WILDLIFE HABITAT MANAGEMENT

(acre)

Code 645

Texas Supplement, Zone 2

BOBWHITE and SCALED QUAIL

Habitat Requirements

Food

The mainstay of the quail diet for the majority of the year is seed. Seed of many forbs, woody plants, hard-seeded grasses, and some agricultural crops are eaten. Seeds high in oil are especially important. Refer to Table 1 for native plants used as food by quail. Quail prefer insects when they are available. Young quail require a diet rich in insects during the first ten weeks of life. In late winter and early spring quail consume green leafy forbs and tender grasses.

The availability of food is an important part of quail habitat. Significant amounts (30 to 60%) of bare ground or sparsely vegetated ground are required for quail to be able move about and find seed and insects.

Cover

Quail are extremely dependent upon the right kinds of cover in the right amounts. The constant threat of predation and vulnerability to adverse weather makes adequate cover the most critical part of quail habitat. At least six different specific kinds of cover have been identified and described for quail: nesting, brooding, screening, loafing, roosting and escape. However, two basic habitat attributes will usually suffice to provide needed cover: adequate grass and adequate brush.

Nesting cover typically consists of residual clumps of grass left ungrazed or lightly grazed from the previous year. Grass clumps about the size of a basketball serve as quail nest sites. Little bluestem and tobosa have been found to be two of the preferred grasses for nest sites in

central and west Texas although many other species of grass will suffice just as well. About 250 such nest clumps per acre is considered the minimum for adequate nest cover with 500 to 1000 per acre being a more ideal density. Another way to picture this ideal nest density is one clump about every 7 to 9 feet. Such a large number of potential nest sites is needed to make it more difficult for nest predators such as raccoons, skunks, fox, coyotes, snakes and hogs to find and destroy nests. When bunchgrass nest sites are in short supply, quail will nest in or near pricklypear, low growing yucca and other spiny plants that provide protection. Grass and associated weeds also serve as screening cover and brooding cover.

Too much grass can potentially be a problem although this is seldom observed in the west half of Texas. Grass that becomes too thick so that quail cannot walk and so that forbs are smothered is not ideal quail habitat. The need for bare ground and sparse vegetation has already been discussed.

Low growing shrubs and brush such as littleleaf sumac, lotebush, condalia, wolfberry, plum, and pricklyash are an essential element of quail habitat, providing loafing, screening and escape cover. The desired density of such low growing shrubby cover is 5 to 15% canopy. Groups or mottes of interconnected shrubs that are dense above, but somewhat open beneath and 20 to 50 feet across are ideal loafing areas. Individual shrubs serve as escape cover and as screening during feeding and loafing.

Shade is needed in summer and dense low cover in winter to provide protection from weather extremes.

Water

Quail can meet their daily water requirement from three different sources. (1) Free water from ponds, creeks, puddles, troughs or dew is used when available. Such water is considered a desirable but not essential part of quail habitat. (2) Succulent vegetation, fleshy fruits and insects contain a high percentage of water. When these food items are eaten, they also provide water for quail. (3) Metabolic water is a by-product of the chemical breakdown of carbohydrates in the digestion process. Metabolic water can provide about one-third of the water requirement of quail.

Nesting hens require extra water during the egg laying period. If adequate water is not present, egg production will be low.

Habitat Arrangement

The proper interspersation of cover and food is especially critical for suitable quail habitat. The different cover types described above and food need to be very closely intermixed. In good quail habitat, birds will not have to venture more than 50 to 100 feet from low shrubby cover. A variety of food plants should be found growing in and among nest cover, screening cover and brooding cover. A large variety and abundance of insects will be found when there is a diversity of grasses, forbs and shrubs. The presence and interspersation of surface water is less critical since quail derive most of their water from foods.

Habitat Size

In order to maintain a viable long-term population of quail, it has been suggested that about 800 birds may be the minimum required. In west and central Texas, 2500 to 5000 acres of suitable and contiguous habitat may be required to maintain this population of quail. Fragmentation of landscapes that disrupts and isolates habitat is a serious threat to bobwhite quail. Individual quail and coveys normally spend the great majority of their lives in a rather small area. Bobwhite quail usually live in areas of 20 to 40 acres while scaled quail will use larger areas of 80 to 300 acres. Therefore, if bobwhite habitat is desired across a 1000 acre tract, all habitat components would need to be present on each and every 40 acre area.

Habitat Management Techniques

Food

1. The food supply for quail can be increased by promotion of low seral plant species, often referred to as weeds. As the cover of strong perennial grasses increases on a site, the presence of desirable quail food plants (forbs and weeds) will decline. However, the quail manager must be careful not to increase food at the expense of nest cover. Reversing plant succession to favor forbs and more weedy plants can be done in several ways:
 - Disking or other similar soil disturbance will reduce grasses and promote forbs. Such disking can be done any time of the year, but is most often carried in late winter and/or early fall prior to germination of many prime quail food plants. Disking should be only deep enough to uproot the majority of existing grasses. Disking in strips or bands adjacent to good nesting cover and good woody cover will insure that cover and food are properly interspersed. Even small amounts of disking will be beneficial, but to impact a large area, disking should be done on 5 to 15% of an area. Disking should not be done on the same area each year. Ideally, some fresh disking, and some one or two year old disking should be present across the landscape. Re-disk areas only when grasses begin to dominate. A program of disking where half is done in early fall and half in late winter will insure a greater diversity of forbs. See Table 1 for species used by quail.
 - Grazing can be used to promote low successional plants and increase the quail food supply. When grasses begin to dominate and suppress forb growth, heavy grazing for a short period will open the grass cover up and allow forbs and weeds to grow. This practice must be carried out carefully since a lack of nest cover is usually more of a problem than the lack of food. The objective is to heavily graze small areas while leaving taller grass across most of the pasture, which can be accomplished by

- herding or the use of feed to concentrate grazing.
- Fire can also be used to remove or reduce excessive grass growth and encourage forb growth. Early winter fires promote cool season forbs. Late winter or early spring burns discourage cool season forbs, but encourage warm season forbs and may invigorate warm season bunch grasses. Prescribed burning according to a written burn plan and carried out under the supervision of an experienced burner has many benefits to wildlife habitat. This practice must be carried out carefully, since fire also temporarily removes nest cover and reduce needed woody cover. A ideal burn for quail habitat is called a mosaic burn, where the fire does not burn across completely. When such a mosaic burn has occurred, do not go back after the burn to "clean up" the islands of grass. One third to half of the area should remain unburned. This is often accomplished by burning under mild conditions which creates a cooler fire. The use of extra internal fireguards to protect specific areas is another way to insure that the burn is not detrimental.
 - Fire and grazing can be used in combination to create small "weed plots" for quail. Burn numerous small areas of 2 to 5 acres within a large pasture. When the pasture is grazed, livestock will move to the burned plots and graze them very heavily, thus favoring the growth of less palatable weeds.
2. The quail food supply is affected by brush management. Mechanical brush management such as grubbing, dozing, chaining or raking will stimulate quail food production. Aerial applied chemical brush management, especially with the herbicide, piclorm, will diminish the production of quail food for at least several years. Individual plant treatment methods of herbicidal application will have much less impact than aerial applications.
 3. Since the fruits of many woody plants are good quail foods, maintaining a good diversity of shrubs and trees will help insure a better quail food supply, which can be accomplished by carefully planned, selective brush management. See Table 1 for woody species used for quail food.
 4. Where farmland is present within quail habitat, crops can be selected which provide food for quail and land can be managed to increase the value to quail.
 - Seed crops such as grain sorghum, corn, peanuts, soybeans, cowpeas, sesame, wheat, oats, rye and triticale can add large amounts of seed for quail.
 - Retain waste grain on soil surface from harvest until land is prepared for next crop. If plowing is needed, use chisel plow rather than disk plow.
 - Retain up to 50 or 100 feet of unharvested grain or seed crops around the edges of fields where other habitat needs are present on adjacent areas.
 5. Annual food plots – If dryland farming is feasible in the area and if good farming soils are present, food plots are an option. Food plots for quail may not increase the quail population, but will often attract quail to the food plots. Plant a minimum of one acre for each 20 to 40 acres of quail habitat for proper interspersation. Plant annuals such as grain sorghum, millets, or small grain or re-seeding annuals such as partridgepea or sunflower. Mixtures of several species are more likely to provide quail food for an extended period. See Table 2 for specific information on food plots for quail. Food plots must be protected from livestock grazing. Where deer numbers are high, plots may be destroyed by deer grazing.
 6. Include forbs, legumes and large seeded grasses in range seeding mixtures. See Table 1.
 7. Feeding quail is not considered a habitat management practice. Feeding may or may not improve quail populations, but it will concentrate quail in the vicinity of feeders. Predators often learn the locations of quail feeders and losses may be increased by the use of feeders.

Cover

1. Nesting cover is maintained by grazing management. Heavy grazing is very detrimental to nest cover. Even moderate grazing can limit adequate nest cover. Light grazing favors a good distribution of nest clumps.
2. If nest cover is absent or severely lacking due to prolonged heavy grazing, a period of one to three years of no grazing is the best way to allow bunchgrasses to recover.
3. On sites which are bare, crusted or produce only short grasses, rainfall infiltration is often inadequate. Deep chiseling, ripping, aeration or roller chopping such sites in strips or bands will increase infiltration and often result in growth of suitable nest cover. Mechanical pitting or the construction of many small depressions can accomplish the same objective.
4. If there is little or no potential for natural recovery of bunchgrass, seeding may be done. Include mid and tall bunchgrass such as little bluestem, sideoats grama, plains bristlegrass, Indiangrass, switchgrass etc. depending on site adaptation.
5. Nest cover can be maintained by allowing a moderate density of spiny shrubs such as pricklypear, catclaw mimosa, agarita, etc. that protect grasses from heavy grazing.
6. The proper kinds and density of woody cover are best achieved by carefully planned brush management. During mechanical brush management, desirable low growing shrubs such as lotebush, condalia, littleleaf sumac, sand plum, agarita, wolfberry etc., should be left intact. Larger clumps of desirable low shrubs often are found around a nucleus of an old mature mesquite. These multi species clumps are especially valuable.
7. When mechanical brush management is carried out, leave dead brush scattered across the area instead of raking into piles. Brush skeletons will serve as short term escape cover and will favor the growth of nest cover.
8. Aerial herbicidal control of target brush species can be detrimental to some desirable
9. low growing shrubs. Leaving some areas unsprayed will insure greater habitat diversity.
10. In cropland areas, maintain field borders, odd areas and fencelines in native vegetation including grasses, forbs and brush. Areas should be 10 to 30 feet wide, although such narrow lanes of habitat may be more susceptible to predation
11. Leave small grain or grain sorghum stubble standing to provide cover for quail feeding on waste grain.
12. Where shrubs are not present, planting of woody vegetation will be required. Plant multi-species motts or strips of shrubs 100 to 300 feet apart. Motts should consist of 10 to 20 shrubs. Strips should consist of two to five rows. Irrigation or water harvesting techniques will be needed for good establishment and growth. Commercially available low growing shrubs include skunkbush sumac, sand plum and fourwing saltbush. Upright strains of pricklypear can also be achieved by transplanting pads or sections of three to five pads. This technique is much faster and less expensive than more traditional methods of establishing woody cover.
13. Where woody plants are present but do not have the correct growth form (such as mesquite), half-cutting can be done to create low shrubby growth. For best results, half cut multi-stemmed, smooth bark mesquite during the growing season.

Water

1. The greatest possible plant diversity will help insure a good supply of insects and fleshy fruits that provide the majority of the water needed by quail. Plant diversity can be increased by conservative grazing and carefully planned brush management.
2. To insure a water supply in periods when insects and succulent vegetation are not present, surface water may be provided. Overflow areas from traditional livestock water development, ground level watering devices, or modifications of livestock water troughs can be used to provide surface water. One important benefit of these

overflows is the green spots they create which attract insects. Refer to standard for Wildlife Watering Facility, Code 648.

3. In dry areas where green vegetation, insects and larger bunchgrass is scarce, the construction of spreader dams or shallow depressions that catch runoff can concentrate limited rainfall to produce desirable quail habitat.
4. Adding surface water has not been shown to increase quail populations or improve quail survival in areas that receive 20 inches or more average annual rainfall, however, quail are attracted to water locations and associated green spots. In more arid regions, surface water may be more beneficial.

References

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Approval

/s/ Gary Valentine

State Wildlife Biologist

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Table 1. Important Native and Naturalized* Quail Food Plants (seed and fruit)**Annual Forbs**

One-seeded croton
 Texas croton
 Woolly croton
 Common sunflower
 Common broomweed
 Buffalobur
 Pigweed
 Pricklypoppy
 Snow-on-the-prairie
 Toothed spurge
 Spurges (other)
 Cowpen daisy
 Sawtooth daisy
 Basketflower
 Nuttall peavine
 Wild vetch
 Giant ragweed
 Common ragweed
 Lambsquarter*
 Russian thistle*
 Partidgepea
 Flax
 Carolina geranium
 Clammyweed
 Filaree
 Tallow weed
 Eryngo
 Carpetweed
 Tidestromia
 Spectaclepod
 Pursh trefoil
 Bluebonnet

Perennial Forbs

Western ragweed
 Maximilian sunflower
 Dayflower
 Wild bean
 Velvet bundleflower
 Illinois bundleflower
 Catclaw sensitivebriar
 Western indigo
 Indian rushpea
 Grassland croton
 Leatherweed croton
 Low wild mercury
 Perennial spurges

Queen's delight

Indian mallow

Sida

Globemallow

Texas nightshade

Ground cherry

Bloodberry

Low menodora

Showy menodora

Sand lilly

Buffalogourd

Balsamgourd

Puccoon

Grasses

Johnsongrass*
 Browntop panicum
 Texas panicum
 Hall's panicum
 Dichanthelium
 Plains bristlegrass
 Reverchon bristlegrass
 Fringed signalgrass
 Thin paspalum
 Knotgrass paspalum
 Slim tridens
 Arizona cottontop
 Cedar sedge
 Rescuegrass*

Woody Plants

Mesquite
 Catclaw acacia
 Roemer acacia
 Whitethorn acacia
 Catclaw mimosa
 Fragrant mimosa
 Bumelia
 Hackberry
 Oak
 Juniper
 Wolfberry
 Pricklyash
 Caroina snailseed
 Littleleaf sumac
 Skunkbush sumac
 Flameleaf sumac
 Poison ivy

Pricklypear

Tasajillo

Agarita

Ephedra

Lotebush

Green condalia

Elbowbush

Texas colubrina

Desert willow

Broom snakeweed

*Indicates non-native
 plants that have become
 naturalized

**Table 2. Planting Information for Commercially Available Seed
Used for Quail Food Plots or to Enhance Quail Food Supply**

	Seed Rate Lbs/Acre ¹		Planting Dates	Planting Depth In.	Minimum Rainfall ³	Comments
	Broadcast or Drilled	Rows ²				
Perennials						
Illinois bundleflower ⁶	13.6	4.5	12/1 - 4/15	¼ - ½	20	
Western ragweed	7.5	2.5	12/1 - 4/15	¼ - ½	20	
Maximilian sunflower	3	1	12/1 - 4/15	¼ - ½	20	
Alfalfa ⁶	4	1.5	9/1 - 4/15	¼ - ½	20	insect production
Fourwing saltbush	15.5	6	9/1 - 4/15	¼ - ½	10	escape, loafing cover
Johnsongrass ⁴	10	3	12/1 - 5/31	¼ - ½	16	
Sorghum alnum	6	2	12/1 - 5/31	¼ - ½	16	short lived perennial
Plains bristlegass	3	1	12/1 - 4/15	¼ - ½	12	

Warm Season Annuals

Grain sorghum ⁵	12	4	4/1 - 5/31	1 - 2	18	
Browntop millet ⁴	6	2	4/1 - 5/31	½ - 1	24	
Proso millet	10	3	4/1 - 5/31	½ - 1	24	
Foxtail millet	4	1.5	4/1 - 5/31	½ - 1	24	
Pearl millet	10	3	4/1 - 5/31	½ - 1	20	
Texas panicum ⁴	6	2	4/1 - 5/31	½ - 1	24	
Common sunflower ⁴	7.5	2.5	9/1 - 2/28	¼ - ½	20	needs cold stratification
Black oil sunflower	15	5	4/1 - 5/31	1 - 2	24	
Sesame	5	1.5	4/1 - 5/31	½ - 1	20	use shattering variety
Partridgepea ⁶	13.4	4.5	4/1 - 5/31	½ - 1	24	good reseeder
Cowpea ⁶	15	5	4/1 - 5/31	1 - 2	20	
Pigweed ⁴	1.5	-	4/1 - 5/31	¼ - ½	18	
Kochia ⁴	1.5	-	4/1 - 5/31	¼ - ½	12	insect production

Cool Season Annuals

Wheat	30	10	9/1 - 11/30	1 - 2	18	
Rye	30	10	9/1 - 11/30	1 - 2	20	
Triticale	30	10	9/1 - 11/30	1 - 2	18	
Turnips	3.5	1	9/1 - 2/28	¼ - ½	24	

Footnotes:

- 1 Seeding rates based on the use of PLS when available, otherwise good quality commercial seed.
- 2 Row planting (20 - 40 inch rows) can be used to allow native quail food plants to establish between rows and to allow better movement of quail.
- 3 Approximate annual rainfall zone recommended for successful establishment. Irrigation recommended when planting west of this line.
- 4 These species are also important agricultural weeds and should not be used in farming areas.
- 5 Includes many types of grain sorghum such as WGF, Egyptian wheat, African millet, Hegari, etc.
- 6 All legumes should be inoculated with the proper strain of Rhizobium for best results.